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PATENT SPECIFICATION

DRAWINGS ATTACHED

829189

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COMPLETE SPECIFICATION

Improvements in Electric Cables

We, THE TELEGRAPH CONSTRUCTION AND MAINTENANCE COMPANY LIMITED, a Company organised under the laws of Great Britain, of Mercury House, Theobald's Road, London, W.C.1., do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention is concerned with an electric cable of the type having a coaxial tube used for conveying speech or other signals and pairs laid up with the tube to provide control telephone circuits.

Various constructions of electrical communication cables are known in which coaxial tubes are used for conveying speech or other signals and twisted pairs or quads are laid up with these tubes to provide control telephone circuits. In cases where there are two or more tubes in the cable the problem of accommodating these pairs is a simple one since they can be located in the interstices between the tubes without increasing the overall size of the cable.

With a single tube cable, however, the accommodation of the twisted pairs or quads is a much more difficult one, since their presence around the periphery of the tube leads to considerable enlargement of the cable and gives rise to many other problems including those of screening and mechanical protection.

It is an object of the present invention to provide an electric cable of the type having a coaxial tube used for conveying speech or other signals and pairs laid up with the tube to provide control telephone circuits, in which the effect of these disadvantages is reduced.

Price 3s 6d

According to the present invention the pairs, instead of being twisted, are composed of flat pairs of plastic-insulated wires laid parallel to one another with a long lay around the periphery of the coaxial tube, being located in equally-spaced relationship to one another.

The coaxial tube may be of the helical membrane type, in which a centre conductor is spaced from an outer tube of aluminium by ahelix of dielectric material, but any alternative construction of tube may be employed.

Metal wires, which may be round aluminium wires, can be laid up around the tube alongside of the flat pairs, any residual space around the periphery of the tube being filled with, for example, polythene or other plastic threads, in order to locate the pairs in fixed positions. An overall screen, made up for example of short lay aluminium tapes, may then be applied, followed by an external sheath of, for example, polythene or p.v.c.

The invention is illustrated in the accompanying drawings, in which:-

Figure 1 is a view in elevation of an electric communication cable in accordance with the invention,

Figure 2 is a part detail sectional view on the line II - II showing the arrangement of the flat pairs of plastic insulated wires.

The drawings illustrate a conventional signalling cable of the coaxial type comprising a central conductor A and an outer conductor C supported by air space insulation B, which conveniently as shown is of the helical membrane type. D indicates the usual outer sheath of insulation, e.g. polythene or p.v.c.

Price 3s

One of the problems in the construction of a communication cable having a single tube is the accommodation of the additional control telephone circuits around the periphery of the tubular conductor C without causing appreciable enlargement of the cable as a whole.

In the cable design of this invention instead of the usual twisted pairs or quads the control telephone circuits are provided by pairs of untwisted wires commonly referred to as "flat pairs", that is to say the two wires indicated respectively at 1 and 2 extend parallel to one another and are laid flat against the surface of the outer conductor C being applied thereto with a long lay.

The pairs of wires 1, 2 are spaced equidistantly around the perimeter of the conductor C, the space therebetween being filled in preferably by uninsulated metal wires, indicated at 3 and cords or strings of polythene or other suitable plastic dielectric material. As is clearly shown in Figure 2 the metal wires 3 are sandwiched between polythene strings 4 and 5.

The number of units including a flat pair 1, 2, a metal wire 3 and interstitial plastic threads will depend upon the overall size of the cable and for a cable wherein the external diameter of the tubular conductor C is approximately 1.3 cms there may be as much as 5 units.

Surrounding the flat pairs 1, 2 is a metallic sheath 7 formed preferably of short lay aluminium tapes, the lay being opposite to that of the flat pairs and over the screen 7 is the external sheath D, e.g. of polythene or p.v.c.

The metal wires 3 may be of slightly larger diameter than the cores of the flat pairs 1, 2 so that they will be in permanent contact with the aluminium tube C and the outer aluminium sheath 7. In this way each flat pair is enclosed within a metal pocket, so that good screening is achieved and cross talk is reduced. The wires serve also to bond the aluminium tape screen 7 to the tube C and, by short circuiting the turns of the spiral of the tape, provide a lower resistance therein.

The wires having an appreciable cross-section of metal, make a useful r duction in the resistance of the screen. The wires may with advantage be bonded ov r at splices by a suitable means for example cold pressure welding.

Another important function served by the aluminium wires is that, being "proud" of the flat pairs they provide some mechanical protection therefor. It may in certain circumstances be desirable to make the polythene strings also somewhat larger in the radial dimension than the flat pairs so that they, too contribute towards the mechanical protection of the pairs.

It will be appreciated that the wires 3, instead of being round, may be of flat or other suitable configuration and that instead of utilising a number of plastic strings as spacers for the respective pairs, flat tapes of plastic material might be used.

The wires 3 may be of high tensile strength in order to contribute to the longitudinal breaking strain of the complete cable to enable the latter to be self-supporting for use as an aerial cable on pole routes.

It is of course important that the number of plastic cords should be even and that half of these be placed on either side of the pairs so that it is in the centre of the unit, otherwise the pairs will have both capacitance unbalance to earth or inductance unbalance. It is an advantage to cross the pairs systematically at splices to remove any tendancy to the occurrence of these kinds of unbalance. The pairs provided in this way can also be used to provide carrier channels. The screening tends to become more efficient at high frequencies.

What we claim is:-

1. An electric communication cable of the coaxial type having a single tube for conveying signals and control telephone circuits comprising plastic insulated wires arranged in flat pairs so as to extend parallel to one another, which pairs are arranged with a long lay around the outer tubular conductor, being equidistantly spaced from each other.

2. An electric communication cable of the screened coaxial type comprising a single tubular conductor for conveying signals, control telephone circuits including plastic insulated wires arranged in flat pairs to extend parallel to one another in continuous surface contact with the tubular conductor to which they are applied with a long lay, metal wires laid up in the space between the flat pairs of insulated wires and so arranged that they establish electrical contact both with the outer conductor and the metallic screening of the cable and an outer sheath of dielectric material.

3. An electric communication cable as claimed in claim 2 wherein the residual spaces around the periphery

of the tubular conductor between the flat pairs and the metal wires are filled in with threads of polythene or other dielectric material.

4. An electric communication cable as claimed in claim 3, in which the flat pairs are spaced apart by a metal wire and a thread of polythene or other dielectric material arranged on each side of the metal wire.

5. An electric communication cable as claimed in claim 2, 3 or 4 in which the metallic screening is formed of short lay aluminium tapes and the metal wires are of aluminium.

6. An electric communication cable as claimed in any of claims 2 to 5, including metal wires having a greater cross-section than that of the flat pairs so as to stand proud thereof for the purpose specified.

7. An electric communication cable substantially as described with reference to the accompanying drawing.

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PROVISIONAL SPECIFICATION

No. 26765 A.D. 1955.

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It will be appreciated that the wires, instead of being round, may be of flat or other suitable configuration and that instead of utilising a number of plastic strings as spacers for the respective pairs, flat tapes of plastic material might be used.

The wires used may be of high tensile strength in order to contribute to the longitudinal breaking strain of the complete cable to enable the latter to be self-supporting for use as an aerial cable on pole routes.

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829,189 COMPLETE SPECIFICATION

1 SHEET This drawing is a reproduction of the Original on a reduced scale

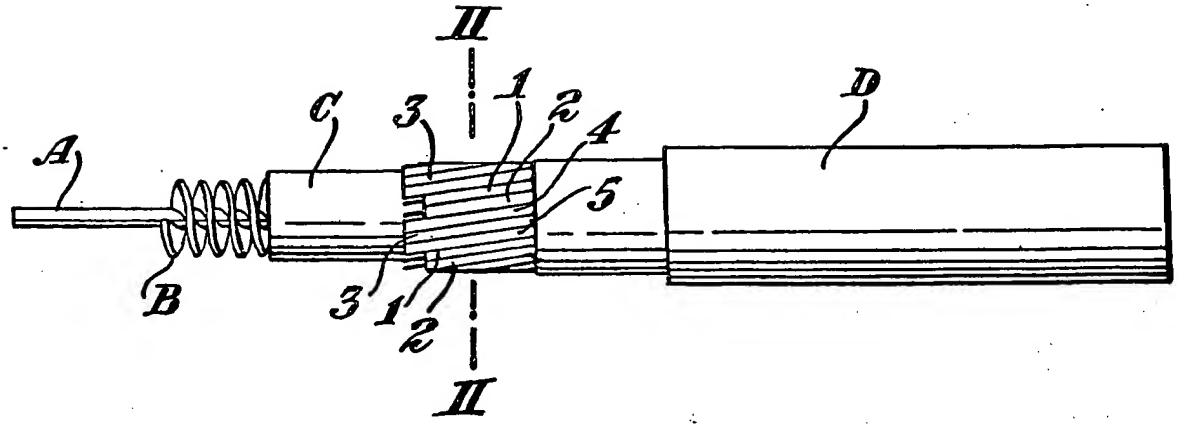

Fig. 1.

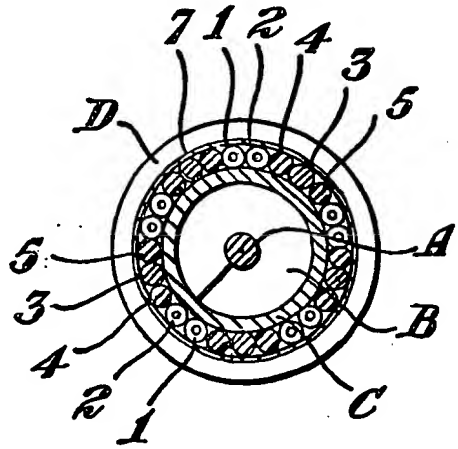

Fig. 2.